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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/103,873	06/24/1998	YOSHIHISA NAGANO	YAO-3950	3577

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EXAMINER
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ART UNIT	PAPER NUMBER
2815	

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	09/103,873	NAGANO ET AL.	
	Examin r	Art Unit	
	José R Díaz	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 July 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-10 and 29-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-10 and 29-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

➢ The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

➢ Claims 1-10 and 29-31 are still rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Specification in view of Matsuura et al. (US Pat. No. 5,132,774). See last Office action mailed on April 9, 2002.

➢ Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Specification in view of Matsuki et al. (US Patent No. 5,960,252).

Regarding claim 32, Applicant teaches a well known semiconductor device (see Figures 10A-10E) comprising: a capacitor (10) provided on a supporting substrate (1)

having an integrated circuit thereon (2) and including a lower electrode (7), a dielectric film (8), and an upper electrode (9); a first interlayer insulating film (11) provided so as to directly cover the capacitor; a first interconnect (14) selectively provided on the first interlayer insulating film and electrically connected to the integrated circuit and the capacitor through a first contact hole (12, 13) formed in the first interlayer insulating film; a second interlayer insulating film (15) provided so as to directly cover the first interconnect and the first interlayer insulating film; a second interconnect (17) selectively provided on the second interlayer insulating film and electrically connected to the first interconnect (14) through a second contact hole (16) formed in the second interlayer insulating film; and a passivation layer (18) provided so as to cover the second interconnect (see Figures 10A-10E). However, Applicant states that Figures 10A-10E fail to teach a second interlayer insulating film having a tensile stress. Matsuki et al, teach that is well known in the art to form first and second insulating layers (20 and 21) of a material, which is subjected to a tensile stress (see cool. 6, lines 45-50 and 55-59). Therefore, it would have been obvious to one having ordinary skill in the art at the same time the invention was made to modify Applicant's Specification to include first and second insulating layers having a tensile stress. The ordinary artisan would have been motivated to modify Applicant's Specification in the manner described above for at least the purpose of improving warp in the substrate and stress in the film applied from the substrate.

Response to Arguments

➢ Applicant's arguments filed July 30, 2002 have been fully considered but they are not persuasive. With regard to Applicant arguments about the features shown in Figures 10A-10E, Applicant acknowledges that Figures 10A-10E describe "an exemplary **conventional** method for fabricating a semiconductor device" (see page 2, lines 31-16 of the Specification). In other words, Applicant recognizes that the features shown in Figures 10A-10E are well known in the art. In addition, Applicant states that the description of such features is disclosed on pages 2-5 (see page 2, lines 13-14). One of such well-known features acknowledged by the Applicant is, for example, the material of the dielectric film (8), which is made of "a high dielectric constant material film or a ferroelectric material film" (see page 10, lines 26-28). Thus, the limitation incorporated to the amended claim 1 is still anticipated by Applicant's Specification, and thus, still anticipated by the combination of references presented in the Office action mailed on April 9, 2002.

Further, Applicant indicates that the problem with the prior art of Figures 10A-10E is the composition of the second interlayer insulating film (15). For instance see page 5, lines 4-10, wherein Applicant states that the second interlayer insulating film (15), made of a plasma TEOS film, provides a compressive stress over the dielectric film (8), which prevents the polarization of the dielectric material of the dielectric film (8). Note that the dielectric film is still made of a material selected from the group consisting of "a high dielectric constant material film" and "a ferroelectric material film" (see page 5, lines 9-10). Applicant proposes the use of an ozone TEOS film as the second interlayer

insulating film to alleviate the stress acting on the capacitor (see page 22, lines 6-14) and improve the remnant polarization (page 23, lines 16-25) by providing a smooth surface over the semiconductor structure (see Figures 11A and 11B). Thus, the only difference between Applicant invention and the prior art of Figures 10A-10E is the material, which the second interlayer insulating film is formed.

The reference Matsuura et al. teaches that is well known in the art to form second interlayer insulating films (14, 35) of ozone TEOS (see Figures 1E, 6A-6E, col. 4, lines 61-64 and col. 5, lines 24-32) over a semiconductor structure for providing a smooth upper surface (col. 3, lines 54-57), which is what Applicant proposed as his invention. Thus, the reference Matsuura et al. cures the deficiency of the prior art taught by Applicant in Figures 10A-10E.

With regard to the claimed remnant polarization and the tensile stress, one of ordinary skills in the art recognizes that such properties are well known properties of such ozone TEOS film. For example, Matsuura et al. teach that the ozone TEOS film is deposited by an APCVD process (see col. 4, lines 61-63 and 66-68) and it is well known that APCVD silicon dioxide layers have tensile stress of, for example, 3×10^9 dynes/cm^2. As evidence of this assertion, the Examiner cites the reference Wolf et al. Wolf et al. disclose well known properties of silicon oxides such as the APCVD silicon oxide (see Table 2 on page 183), which supports the Official Notice taken in the Office action mailed on April 9, 2002. Furthermore, since it is well known that ozone TEOS improves the polarization of, for example, ferroelectric capacitors, the claimed remnant of polarization was considered as an optimum value discovered by Applicant. In

addition, Applicant should note that the reference Matsuki et al. used in the rejection of the new claim 32 provides evidence that further supports the Examiner position taken with regard to the ozone TEOS layer. For example, Matsuki et al. teach the well-known ozone TEOS layer as the second interlayer insulating film (21) (see Figure 4) having a tensile stress (see col. 6, lines 45-48 and 55-59) and an improved remnant of polarization (See Figures 3A-3C). Therefore, Applicant's arguments are not persuasive since first, the combination of reference anticipates the claimed limitations; second, evidence was provided to support well known teachings; and finally, a motivation was provided to combine the references. As such, the rejection is considered to be proper.

Conclusion

➢ **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 9:00-5:00 Monday, Tuesday, Thursday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 746-3891 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD
September 19, 2002

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800